L 40797-65 EPA(s)-2/EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/T/EWP(t)/EWP(z)/EWA(c)/EWP(b) Pad/Pt-10/Pu-4 IJP(c) JD/WW/HW/JG

ACCESSION NR: AP4047873 S/0279/64/000/005/0108/0111 43

AUTHOR: Kornilov, I. I. (Moscow); Shinyayev, A. Ya. (Moscow) B

TITLE: Diffusion of metallic N_3Nb-N_3Ta compounds in solid solutions

SOURCE: AN SSSR. Izvestiya. Metallurgiya i gornoye delo, no. 5, 1964, 108-111

TOPIC TAGS: nickel niobide, nickel tantalide, nickel alloy, solid solution, metal diffusion

ABSTRACT: The authors investigate the diffusion process in Ni_3Nb-Ni_3Ta alloys containing 100, 96, 80, 40 and 20% Ni_3Nb molten in an arc furnace. Ni, Nb and Ta were used in the charge. The composition of the experimental alloys was selected according to the Ni_3Nb-Ni_3Ta phase diagram which shows that the alloys crystallize as single-phase specimens with a metallic compound lattice. Two-phase alloys form whenever the concentration of the constituents deviates from the stoichiometric composition. The minimum fusion point of the specimens was observed when Ni_3Nb was present in quantities of 96%. Investigations of electrical resistance and the mechanical properties of alloys confirm the absence of a

Card 1/2

L 40797-65
ACCESSION NR: AP4047873 0

phase transformation. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: None

SUBMITTED: 24Jul63 ENCL: 00 SUB CODE: MM

NR REF SOV: 005 OTHER: 004

Card 2/2

ACCESSION NR: AP4019496 S/0078/64/009/003/0702/0704

AUTHORS: Kornilov, I. I.; Boriskina, N. G.

TITLE: The $TiFe_2$-$TiCr_2$ system

SOURCE: Zhurnal neorg. khimii, v. 9, no. 3, 1964, 702-704

TOPIC TAGS: $TiFe_2$ system, $TiCr_2$ system, x ray analysis, termal analysis, titanium iron chromium system, solid solution, $MgZn_2$ lattice, polymorphism, titanium alloy annealing, crystal lattice parameter, $Ti(CrFe)_2$, equilibrium diagram, beta titanium phase, polymorphic transition, hexagonal structure

ABSTRACT: X-ray, thermal and microscopic examination of the Ti-Fe-Cr system was conducted to explain the effect of $TiFe_2$ and $TiCr_2$ on the crystallization of a continuous series of solid solutions of the $MgZn_2$ lattice type, and to explain the appearance of polymorphism of $TiCr_2$ in alloys annealed for a long time at low temperatures. The continuous increase in the a and c parameters of the crystal lattices in going from $TiFe_2$ to $TiCr_2$ (fig. 1) confirms the existence of a continuous series of solid solutions between the isomorphic structures of $TiFe_2$ and $TiCr_2$. The solid solution is represented by

ACCESSION NR: AP4019496

the ternary phase (gamma-phase) $Ti(CrFe)_2$ of interchangeable composition in which the isomorphic Cr and Fe replace one another. The equilibrium diagram of the system was constructed (fig. 2). The gamma-phase is crystallized exclusively up to 60 wt.% Cr; in the 60-65 wt.% Cr range a small amount of a second solid phase, the beta-phase, is also formed. Annealing at 550 and 800C has little effect of the microstructure of the alloys; annealing at 1000C breaks down a large amount of the beta-phase. X-ray study of a series of Ti-Cr-Fe alloys annealed for 1000 hours at 450C shows that the $Ti(CrFe)_2$ phase with the $MgZn_2$ type structure is also formed by the breakdown of the solid solutions based on beta-titanium. Thus, iron stabilized the hexagonal modification of $TiCr_2$. Melts containing less than 8.5% Fe undergo polymorphic transition of the $Ti(CrFe)_2$ phase at temperatures below 1220C. At all Fe concentrations above 8.5% the hexagonal structure of $Ti(CrFe)_2$ is stable at room temperature. Orig. art. has: 3 figures.

ASSOCIATION: Institut metallurgii im. A. A. Baikova (Metallurgical Institute)

Card 2/5

ACCESSION NR: AP4019496

SUBMITTED: 30Jan63 DATE ACQ: 31Mar64 ENCL: 02

SUB CODE: MM NR REF SOV: 004 OTHER: 003

Card 3/5

CCESSION NR: AP4019496 ENCLOSURE: 01

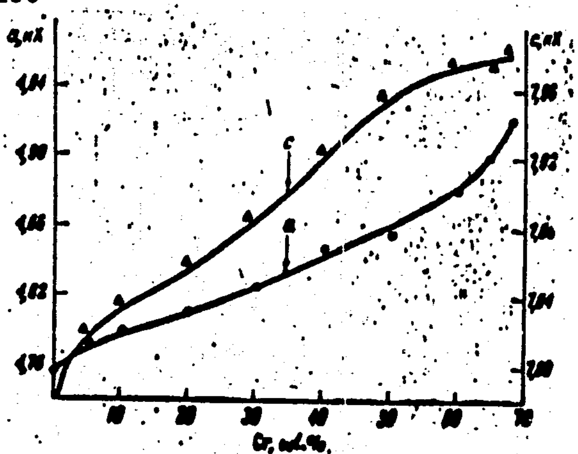

fig. 1

Phase diagram- parameters a and c of alloys annealed at 1000C.

Card 4/5

L 6614-65 EWT(m)/EWP(q)/EWP(b) JD/JG
ACCESSION NR: AP4036967 S/0078/64/009/005/1163/1168

44

AUTHORS: Boriskina, N.G.; Kornilov, I.I.

TITLE: Phase diagram of the titanium-chromium-iron system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 5, 1964, 1163-1168

TOPIC TAGS: titanium chromium system, titanium iron system, titanium chromium iron system, iron rich alloy, chromium rich alloy

ABSTRACT: X-ray, microstructural, and thermal analysis were used to investigate the Ti-Cr-Fe system, particularly 1) the region of alloys within the limits of the Ti-$TiFe_2$-$TiCr_2$ system, 2) alloys rich in Fe and Cr, and 3) the interaction of the $TiFe_2$ and $TiCr_2$ phases. Cast alloys of high-purity components were annealed in a five-step, 1900-hour procedure and studied after quenching at 1000 and 800 C and zonal annealing at 500 C. The compositions of the alloys investigated are shown on the triangle in Fig. 1. The phase composition of these alloys was found to be determined by the presence of solid solutions based on β-Ti, α-Fe, and Cr; ternary (τ-phase $Ti(CrFe)_2$; the compound TiFe (δ-phase); the cubic modification of $TiCr_2$; $Ti_5Cr_7Fe_{17}$ (χ-phase); and γ-Fe. Iron was found to

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L 6614-65
ACCESSION NR: AP4036967

promote the stabilization of the hexagonal modification of $TiCr_2$. Solid solutions based on $TiCr_2$ and $TiFe_2$, with a phase composition at 20-1350 C corresponding to the quasibinary system, crystallize first in a wide concentration range of components of alloys of the $TiFe_2$-$TiCr_2$ section. In the Ti-$TiFe_2$-$TiCr_2$ system the transformations observed in the solid state are of the eutectoid type with a four phase reaction $\beta \rightleftarrows \alpha + \gamma + \delta$; the ternary eutectoid has 8% Cr and 12% Fe. A four-phase peritectic reaction γ + liquid $\rightleftarrows \beta + \delta$ occurs in the Ti-$TiFe_2$-$TiCr_2$ system at 1200 C; the ternary peritectic composition has about 30% Fe and 12% Cr. A liquid ternary compound $Ti_5Cr_7Fe_{17}$ (χ-phase) with an α-Mn structure is formed in the Fe-rich alloy region. The reaction of this compound with α-Fe and Cr solid solutions and with liquid- and solid-state $Ti(CrFe)_2$ is explained. It is suggested that the results of the investigation of the components of the Ti-Cr-Fe ternary system may be used for constructing partial phase diagrams of the Ti-Cr-Fe-Al-Si-B systems and establishing optimum compositions of new titanium alloys of practical value. Orig. art. has: 3 figures.

ASSOCIATION: none

SUBMITTED: 12Apr63 ENCL: 01 SUB CODE: MM

NO REF SOV: 008 OTHER: 006

Card 2/3

L 6614-65
ACCESSION NR: AP4036967

ENCLOSURE: 01

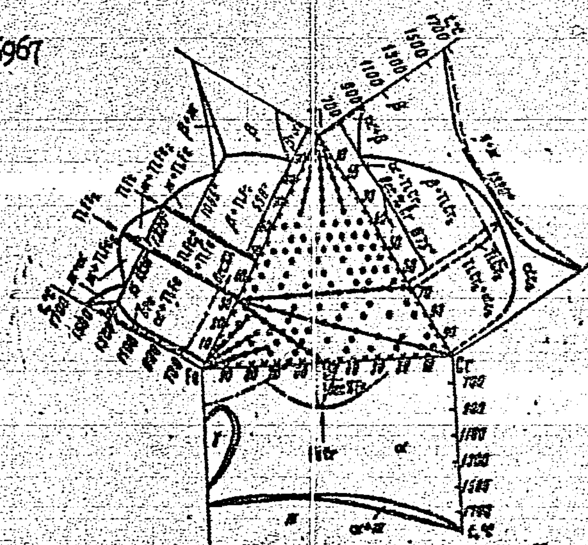

Fig. 1. Composition triangle of the Ti-Cr-Fe system. Dots show compositions of the investigated alloys. Bec % = weight %; ж = liquid

Card 3/3

ACCESSION NR: AP4041587 S/0078/64/009/007/1662/1668

AUTHOR: Ko, Chih-ming; Kornilov, I. I.; Py*layeva, Ye. N.

TITLE: Phase diagram of titanium-aluminum-molybdenum-vanadium system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 7, 1964, 1662-1668

TOPIC TAGS: titanium aluminum alloy, molybdenum containing alloy, vanadium containing alloy, alloy phase composition, alloy structure, alloy property

ABSTRACT: Sixty-nine alloys of the Ti-Al-(Mo:V = 1:1) system with an Al + Mo + V content of up to 50% were levitation melted in an atmosphere of purified helium from iodide titanium, 99.99% pure aluminum, 99.9% pure molybdenum, and 99.3% pure vanadium, and studied by microscopic, x-ray diffraction, and dilatometric analysis, and by measurement of the hardness and electrical resistivity. Alloys were investigated in the as-cast condition and also after heat treatment. Isothermal sections of the Ti-Al-(Mo:V = 1:1) system, plotted on the basis of the microscopic and x-ray phase analyses, showed the following phases and phase regions to be in equilibrium: α, β, γ,

L 13619-65 EWT(m)/EPF(n)-2/EWP(b) Pu-4 JD/JG
ACCESSION NR: AP4046452 S/0078/64/009/010/2416/2423

AUTHOR: Kornilov, I. I.; Polyakova, R. S.

TITLE: Quaternary Nb-Ti-(ΣMoV) alloys (at the ratio Mo/V = 3/1)

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 10, 1964, 2416-2423

TOPIC TAGS: niobium base alloy, titanium base alloy, molybdenum base alloy, titanium containing alloy, molybdenum containing alloy, niobium containing alloy, vanadium containing alloy

ABSTRACT: Three series of niobium-titanium-molybdenum-vanadium alloys with compositions corresponding to sections I, II, and III of the composition tetrahedron (see Fig. 1 of the Enclosure) and with an Mo/V ratio of 3/1 were investigated in an effort to determine the character of the chemical interaction of components and the suitability of the alloys for practical applications. The pattern of solidus temperature-composition curves for the alloys tested indicated that all the alloys tested solidify as solid solutions. This was confirmed

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L 1-9-65 0

ACCESSION NR: AP4046452

by microscopic examination and by x-ray diffraction patterns; the ...owed that the solid solution has a bcc structure. In ti- ...on alloys the high-temperature phase decomposes with decreas- ing temperature. These alloys have a two-phase structure at room tem- perature; alloys located in close proximity to the titanium corner ...single-phase structure and consist of α-titanium-base solid ... The microhardness of alloys increases with increasing al- ... alloys of section III have the highest hardness. For in- ... an alloy containing 10% Nb, 22.5% Ti, 50.625% Mo, and 16.875% ... hardness of 500 kg/mm^2 at room temperature and 300 kg/mm^2 at ... alloys of section I have the highest resistivity, up to 90 mohm/cm in an alloy containing 10% Nb, 67.5% Ti, 16.875% Mo and 5.625% ... Orig. art. has: 1 table and 10 figures.

ASSOCIATION: none

SUBMITTED: 28Sep63 ENCL: 01 SUB CODE: MM

NO REF SOV: 008 OTHER: 004 ATD PRESS: 3129

Card 2/3

ACCESSION NR: AP4046432 ENCLOSURE: 01

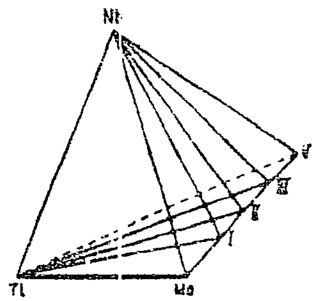

Fig. 1. Composition tetrahedron of the Nb-Mo-Ti-V system

Card 3/3

ACCESSION NR: AP4013333 S/0020/64/154/003/0638/0641

AUTHORS: Kornilov, I.I.; Glazova, V.V.

TITLE: Investigation of Certain Strength Characteristics of the Chemical Bond at Ti sub 6 O and Ti sub 3 O Compounds Formed from alpha-Solid Solutions of the Titanium-Oxygen System

SOURCE: AN SSSR. Doklady*, v. 154, no. 3, 1964, 638-641

TOPIC TAGS: thermal expansion, titanium oxygen alloy, Ti sub 6 O, Ti sub 3 O titanium alloy

ABSTRACT: The experimental investigation of the thermal expansion of titanium-oxygen alloys at temperatures of up to 800 C showed the empirical relation between Young's modulus and the coefficient of thermal expansion of that system. Specimens were prepared in an electric arc furnace with a permanent electrode in argon. Mg, Si, Al, Fe, Ni, Cr, O_2, N_2 and titanium dioxide with 99.93% TiO_2 were tested. Oxygen introduction occurred through a master alloy prepared from compressed titanium and titanium dioxide. Thermal ex-

Card 1/2

L 14312-65 EWT(m)/EWP(b)/EWA(d)/EWP(w)/EWP(t) IJP(c)/ASD(m)-3 JD/MLK
ACCESSION NR: AT4048045 S/0000/64/000/000/0007/0014

AUTHOR: Kornilov, I. I. (Professor, Doctor of chemical sciences)

8

TITLE: Perspectives in the development of research into the heat resistance of titanium alloys

27

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 7-14

TOPIC TAGS: titanium alloy, alloy heat resistance, alloy creep, heat resistant alloy, transition element

18

ABSTRACT: Previous claims that titanium alloys can be useful up to temperatures of 400-450C appear to be overstatements since pure titanium tends to creep even at room temperatures. A review of publications of the Metallurgizdat and the SSR Academy of Sciences indicates that the key to the heat resistance of titanium alloys is the interaction of titanium with other elements, in particular those in the transitional region of the periodic table which form solid solutions with other elements or, in a more limited sense, with metallic compounds. A careful review of the literature and the correlation of graphs

Card 1/2

L 14312-65
ACCESSION NR: AT4048045

showing heat resistance as a function of composition for certain simple and multicomponent titanium systems have, in concert with the rules delineated in the aforementioned Soviet publications, permitted the author to predict the composition of new titanium alloys with optimal heat-resistant characteristics. An important role in the formation of these alloys was played by the stable structure of α- and β-solid solutions, the metallic compounds of titanium, and the alloys based on these metallides. Outstanding among these was the multicomponent α- and β-solid solution based on titanium and its aluminum compounds, Ti_6Al and Ti_3Al, which were formed in the α-solid solution of the Ti-Al system. Alloys correctly formed from this system can have a working temperature as high as 600-800C. Orig. art. has: 7 figures.

ASSOCIATION: None

SUBMITTED: 15Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 020 OTHER: 002

Card 2/2

L 14310-65 EPF(c)/EPR/EWG(j)/EWT(m)/EWP(b)/EWP(t) Pr-4/Ps-4 ASD(m)-3
ACCESSION NR: AT4048046 JD/MLK S/0000/64/000/000/0015/0025

AUTHOR: Kornilov, I. I. (Professor, Doctor of chemical sciences), Glazova, V. V.

TITLE: Phase diagram of the Ti-O_2 system and some properties of the alloys of this system

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 15-25

TOPIC TAGS: titanium alloy, titanium dioxide, alloy phase composition, alloy hardness, alloy electrical resistance, alloy crystal structure, titanium oxide

ABSTRACT: The interaction of titanium with oxygen and the equilibrium curves of this system have, up to now, been based on the α-solid solution of oxygen in titanium and the compounds TiO, Ti_2O_3, and TiO_2 appearing in it. However, the literature has little to say about the effect certain possible solid state reactions occurring in the alloy might have on the properties of the alloy. Microscopic and x-ray analyses, as described by Ye. S. Makarov, and analyses of the changes in the microscopic hardness, the electrical resistance, and the thermoelectromotive force were carried out on alloys of the Ti-O_2 system, which were quenched after being raised to various temperatures at concentration intervals
Card 1/3

L 14310-65
ACCESSION NR: AT4048046

of from 0 to 35 at. % O_2. From the results of these experiments and the curves of the graphs showing properties of the alloy as a function of composition, plotted according to N. S. Kurnakov's method, the authors were able to pinpoint anomalies in the Hall effect and postulate the existence of two new compounds, i.e.: Ti_6O and Ti_3O. They thus added new equilibrium curves to the graphs of the Ti-O_2 system. Ti_6O is stable up to about 820-830C, and Ti_3O is probably stable above 1400C. The compositions of these compounds should characterize the maximal degree of ordering of oxygen atoms on a lattice of the α-solid solution. Tests over a wide range of temperatures and concentrations established the dependence of the coefficient of thermal expansion on the composition of the alloys in this system. This led in turn to conclusions as to the stability of the chemical bond between the atoms of titanium and oxygen in the crystal lattice of the alloys and the compounds Ti_3O and Ti_6O. Tests with various periods of heating at temperatures of 300-700C and at oxygen concentrations ranging from 0-18 at.% enabled the authors to calculate the speed of plastic deformation of the various alloys at the time of maximum reaction. In short, the authors established the general character of the effect of oxygen on the behavior of titanium at varying temperatures. "The authors thank T. F. Zhuchkova for her help in carrying out the experimental work." Orig. art. has: 5 graphs, 6 photomicrographs, 2 tables and 2 formulas.

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L 14310-65
ACCESSION NR: AT4048046

ASSOCIATION: None

SUBMITTED: 15Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 014 OTHER: 009

0

Card 3/3

L 32911-65 EWP(e)/EWT(m)/EPF(n)-2/EWA(d)/EPR/EWP(j)/T/EWP(t)/EWP(b) Ps-4/ Pu-4 JD/JG/AT/JAJ/RM/WH

ACCESSION NR: AP5001608 S/0279/64/000/006/0019/0031

AUTHOR: Kornilov, I. I. (Moscow)

40
B

TITLE: Certain problems of metallochemistry and new inorganic materials

SOURCE: AN SSSR. Izvestiya. Metallurgiya i gornoye delo, no. 6, 1964, 19-31

TOPIC TAGS: metallochemistry, ionization potential, atomic radius, element electronegativity, metal, metalloid, metallic compound, solid solution formation, metallochemical property, inorganic compound, inorganic material, metallide

ABSTRACT: Among the basic problems to be studied in metallochemistry are the formation of liquid and solid metallic solutions and of metallic compounds designated as metallides; the nature of chemical bonds in solutions and metal compounds; the reaction between metallides and the formation of solid solutions of ternary or more complex compounds between them; and crystallochemical reactions. Based on his extensive works and other publications, the author classified metallic and metalloid elements according to their ionization potential, atomic radius and

Card 1/3 18

L 17211-65 EPF(n)-2/EPR/EWT(m)... WW/JD/JG/MLK

ACCESSION NR: AT4048050

S/0000/64/000/000/0043/0046

AUTHOR: Korniiov, I. I. (Professor, Doctor of chemical sciences), Nartova, T. T., Savel'yeva, M. M.

TITLE: Phase equilibria for alloys of the Ti_3 Al-Zr type in the ternary Ti-Al-Zr system

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov, 6th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 43-46

TOPIC TAGS: titanium alloy, aluminum alloy, zirconium alloy, alloy structure, alloy phase composition

ABSTRACT: Although the binary systems Ti-Al, Ti-Zr, and Al-Zr have been extensively studied, the ternary system Ti-Al-Zr, potentially a producer of very heat-resistant alloys, has never been studied. The authors therefore set out to study the phase equilibria and certain other characteristics of the Ti-Al-Zr system, in particular the series of systems running, in composition, from pure Zr to pure Ti_3Al (16% Al by weight). The samples were prepared by induction melting from a suspended position without

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L 14311-65
ACCESSION NR: AT4048050

crucibles from metal of nearly perfect purity; loss did not exceed 1%. The samples were uniformly heated in water to temperatures ranging from 1200 to 500C for periods of 6-750 hours, respectively. At the same time, samples were heated in a vacuum. Thermal, microstructural, and x-ray analyses were performed on each sample, and the density, hardness, microhardness, and electrical resistance at room temperature were plotted as functions of composition. Most of these were determined in the usual ways, but for a study of the microhardness, a corrosive of the [illegible] was used: 8 parts glycerol, 1 part hydrofl[illegible]

[illegible]

L 14311-65
ACCESSION NR: AT4048060

SUBMITTED: 15Jul64

ENCL: 01

SUB CODE: MM

NO REF SOV: 005

OTHER: 005

Card 3/4

L 14322-65 EWT(m)/EPF(n)-2/EPR/EWP(t)/EWP(b) Ps-4/Pu-4
-FTC(p) JD/WW/JG/MLK
ACCESSION NR: AT4048051 S/0000/64/000/000/0047/0053

AUTHOR: Kornilov, I. I., (Professor, Doctor of chemical sciences), Boriskina, N. G. (Candidate of technical sciences)

TITLE: A study of the phase structure of the alloys of the Ti-Al-Zr system along the Ti_3Al-Zr section

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titani i yego splavov. 5th Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 47-53

TOPIC TAGS: alloy structure, alloy phase transformation, alloy hardness, quenching, titanium alloy, aluminum alloy, zirconium alloy

ABSTRACT: Although aluminum and zirconium have a marked effect on alloys based on α-titanium and all binary systems of these 3 elements have been extensively investigated there is no existing literature on the ternary system. The ... metals were ... prepare the samples tested, and the samples were prepared in an arc furnace ... non-consumable electrode in an argon atmosphere. ... samples were heated to ... held there for 10 hours, after which some were immediately quenched in ice-

Card 1/3

L 14322-65
ACCESSION NR: AT4048051

water while others were cooled to lower temperatures and held there for extended periods of time before being quenched. Another series of samples was quenched from 500C and [illegible] from 500C. After quenching, a microstructure [illegible] parameter was used for the [illegible] hardness were also determined [illegible] density of the [illegible] results, shows a relationship which [illegible] Al-Zr, but is analogous to them. An increase in the proportion of aluminum should cause the characteristics of the curve to approach the Zr-Al system. Orig. art. has: 3 graphs, 9 photomicrographs, and 1 table.

ASSOCIATION: None

SUBMITTED: 15Jul64 ENCL: 01 SUB CODE: MM

NO REF SOV: 004 OTHER: 004

Card 2/3

L 14322-65
ACCESSION NR: AT4048051

ENCL: 01

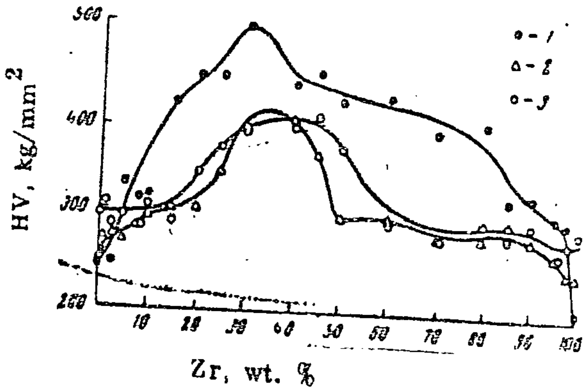

Fig. 1 - Dependence of the hardness on alloy composition after quenching:

1 - at 1100C, 2 - at 600C, 3 - at 500 C.

Card 3/3

L 9400-65 EWT(m)/EWP(q)/EWP(b) Pad ASD(m)-3/AS(mp)-2 JD/HW

AP4043925 [illegible]/0165

AUTHOR: Kornilov, I. I. (Moscow); Myasnikova, K. P. (Moscow)

TITLE: Phase diagram and some physical properties of alloys of the nickel-ruthenium system

SOURCE: AN SSSR. Izv. Metallurgiya i gornoye delo, no. 4, 1964, 159-165

TOPIC TAGS: nickel ruthenium system, nickel ruthenium alloy, alloy phase diagram, alloy structure, alloy microhardness, alloy electric resistivity, alloy microstructure

ABSTRACT: The phase composition, microstructure, hardness, microhardness, and electric resistivity of 26 binary Ni-Ru alloys containing from 0 to 100% Ru were investigated. The alloys were melted from 99.99% pure Ni and 99.98% pure Ru in an electric arc furnace in [illegible] a pressure of 300 mm Hg. After a [illegible]—[illegible]% reduction, the [illegible] were homogenized at 1573K [illegible] and then heat-treated [illegible]dividual tests. During reduction the as-cast alloys with [illegible] did not crack, while those with more than 50% Ru did crack.

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L 8400-65
ACCESSION NR: AP4043925

The phase diagram of the Ni-Ru system (see Fig. 1 of the Enclosure) shows that crystallization of the melt proceeds according to a peritectic ($\beta + L = \alpha$) reaction at 1823 ± 10K. At this temperature, the solubility of Ru and Ni in each other is at a maximum of 41 and 53 at%, respectively; the corresponding figures for 873K are 7.0 and 5.0 at%. The lattice constants of Ni and Ru solid solutions change linearly with the concentration of the second component. The lattice constant of the α-solid solution increases with increased Ru content; the lattice constants of the β-solid solution decrease with increased Ni content, although the c/a ratio remains practically constant. No phase transformations occur in the Ni-Ru alloys in the solid state. Microhardness of the α- and β-solid solutions increases with increased content of the alloying elements, regardless of the quenching temperature. In the two-phase region, the microhardness of each phase remains constant for a given quenching temperature. Changes in the specific resistivity and hardness of the alloys, depending on the alloying element concentration and temperature, follow the pattern for the systems with limited solid solutions. Orig. art. has: 6 figures and 2 tables.

ASSOCIATION: none

Card 2/4

L 8400-65
ACCESSION NR: AP4043925

SUBMITTED: 25Feb64 ATD PRESS: 3101 ENCL: 01

SUB CODE: MM NO REF SOV: 005 OTHER: 001

Card 3/4

L 8400-65

ACCESSION NR: AP4043925

ENCLOSURE: 01

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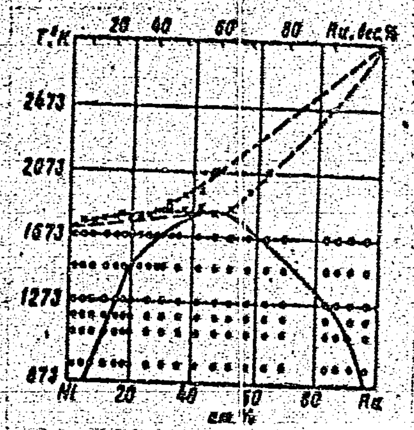

Fig. 1. Phase diagram of the Ni-Ru system

Card 4/4

KORNILOV, I.I. (Moskva) ; GLAZOVA, V.V. (Moskva)

Heat-resistance of oxygen-containing titanium. Izv. AN SSSR Met. i gor. delo no.3:169-173 My-Je'64 (MIRA 17:7)

L 16593-65 EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/T/EWP(t)/EWP(b) Pu-4 IJP(c)/ASD(m)-3
JD/JG/MLK

ACCESSION NR: AT4048070 S/0000/64/000/000/0190/0195

AUTHOR: Kornilov, I.I. (Professor, Doctor of chemical sciences), Belousov, O.K., Mikheyev, V.S.

TITLE: A study of creep in Ti-V-Nb-Mo alloys

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy* soveshchaniya, Moscow, Izd-vo Nauka, 1964, 190-195

TOPIC TAGS: titanium alloy, titanium alloy creep, titanium alloy heat resistance, vanadium admixture, niobium admixture, molybdenum admixture

ABSTRACT: When vanadium, niobium and molybdenum are introduced into titanium the ultimate strength and elasticity are increased, while the relative elongation and resiliency remain at high levels. The present paper considers the heat resistance of Ti-V-Nb-Mo alloys. As in earlier studies, heat resistance was tested by the centrifugal method. During the first stage, samples were tested at 500C and an initial stress of 15 kg/mm^2 for 100 hours; the second stage was 100 hours at 20 kg/mm^2; during the third stage, the temperature was increased to 600C at the previously mentioned stress for 100 hours.

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L 16593-65

ACCESSION NR: AT4048070

Thus, the total time was 300 hours at stresses of 15-20 kg/mm^2 and temperatures of 500 and 600C. The alloy samples were made with V:Nb:Mo=1:1:1 (section I), Mo:sum of V, Nb=2:1 (section II), Nb:sum of V, Mo=2:1 (section III), and V: sum of Nb, Mo=2:1 (section IV). The creep curves are shown in Fig. 1 of the Enclosure. Analysis of the relationship between deflection and duration of deformation showed that the alloys behaved differently. Titanium had the highest creep rate, while alloys near the boundary of saturated α_4 solid solutions had higher resistance. Alloys with B_4 solid solutions had the highest strength. The creep rate of these alloys at 500C and a stress of 15-20 kg/mm^2 for 200 hours was near to zero, while at 600C the creep of these alloys increased sharply. The data obtained on the relationship between heat resistance, composition and phase structure indicate that all alloys of the α- phase of the Ti-V-Nb-Mo alloy are rapidly weakened at 500C and 15 kg/mm^2 and cannot resist heat for a long time under these conditions. The introduction of molybdenum is the best way to increase the heat resistance. These data corroborate the results of I. I. Kornilov on the variation of heat resistance in systems with limited solubility in the solid state and polymorphic characteristics of one of the components. Orig. art. has: 4 figures.

Card 2/4

L 16593-65
ACCESSION NR: AT4048070

ASSOCIATION: none

SUBMITTED: 15Jul64 ENCL: 01 SUB CODE: MM, AS

NO REF SOV: 012 OTHER: 002

Card 3/4

L 16593-65
ACCESSION NR: AT4048070

ENCLOSURE: 01

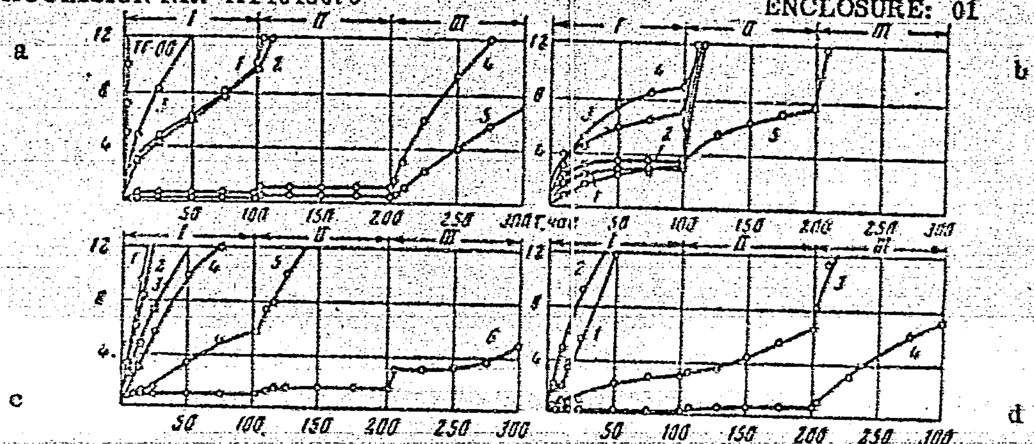

Fig. 1. Creep curves of titanium and titanium alloys of the system Ti-V-Nb-Mo. Testing conditions: I - t = 500C, σ = 15 kg/mm^2; II - t = 500C, σ = 20 kg/mm^2; III - t = 600C, σ = 20 kg/mm^2. a. section I, $\sum$(V, Nb, Mo): 1-2.4%, 2-4.2%, etc. b. section II, $\sum$(V, Nb, Mo): 1-2.4%, 2-4.2%, etc. c. section III, $\sum$(V, Nb, Mo): 1-2.4%, 2-4.2%, etc. section IV, $\sum$ (V, Nb, Mo): 1-2.4%, 2-4.2%, etc.

Card 4/4

L 15211-65 EWT(m)/EWP(w)/EWA(d)/EWP(t)/EWP(k)/EWP(b) Pf-4 SSD/AFTC(p)/ -3/ASD(p)-3/AFMD(t)/IJP(c) /MJW/MLK/MJW

ACCESSION NR: AT4048073 S/0000/64/000/000/0208/0211

AUTHOR: Kornilov, I. I., (Professor, Doctor of chemical sciences); Andreyev, O. N.; Voshedchenko, B. M.

TITLE: Investigation of creep and thermal stability of AT4 alloy at 500C

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 208-211

TOPIC TAGS: titanium alloy, AT4 alloy, creep, creep rate, thermal stability, creep strength, structural stability

ABSTRACT: Creep behavior and thermal stability of AT4 titanium-base alloy (4.67% Al, 0.86% Cr, 0.31% Fe, 0.27% Si, and 0.001% B) have been investigated at 500C. In a 1000-hr test under 5 kg/mm^2 stress, total elongation was 0.5%, and under 2.5 kg/mm^2 stress it dropped to 0.18%. The creep rate at the steady stage was $0.3 \cdot 10^{-6}$% per hour under 2.5 kg/mm^2 stress and $1.6 \cdot 10^{-6}$% per hour under 5 kg/mm^2 stress.

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L 15211-65

ACCESSION NR: AT4048073

3

Thus, AT4 alloy at 500C has a substantially higher creep resistance than such titanium alloys as OT4, VT6, and OT4-2; this was also displayed in a 100-hr creep test under a 20 kg/mm^2 stress (see Fig. 1 [illegible] Enclosure). The mechanical properties of AT4 alloy remain [illegible] changed, and it retains its high ductility after 100 hr [illegible] at [illegible]C. According to [illegible], AT4 alloy can [illegible] cold-rolled into various semifin[illegible], including [illegible] mm in diameter with [illegible] The alloy has [illegible] weldability. Orig. art. has: 3 figures.

ASSOCIATION: none

SUBMITTED: 15Jul64 ENCL: 01 SUB CODE: MM, AS

NO REF SOV: 001 OTHER: 000 ATD PRESS: 3138

Card 2/3

L 15211-65
ACCESSION NR: AT4048073 ENCLOSURE: 01

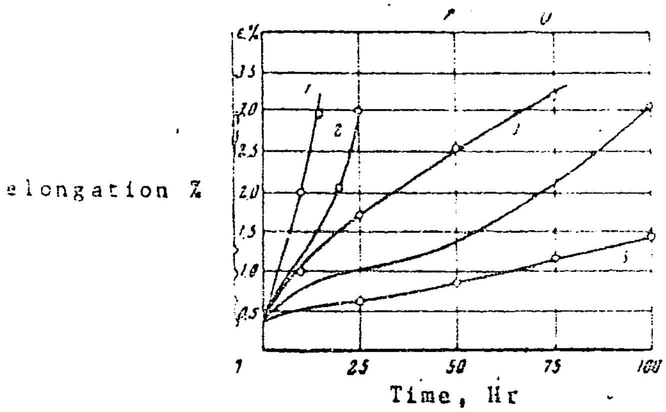

Fig. 1 Creep curves for titanium alloys

1 - OT4, 2 - VT5, 3 - VT5-1, 4 - VT6, 5 - AT4

Card 3/3

L 15666-65 EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/EWP(t)/EWP(b) Pu-4 ASD-3/AFFTC/ ASD(m)-3 WJW/JD/JG/MLK

NR: AT4048075 S/0000/64/000/000/0218/0221

Kornilov, I. I. (Professor, Doctor of chemical sciences); Nartova, T. T.; M. M.

TITLE: Creep of Ti-Zr-Al-Sn alloys at 750C

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy Moscow, Izd-vo Nauka, 1964, 218-221

titanium alloy, titanium alloy creep, titanium alloy mechanical property, aluminum containing titanium alloy

A great importance in the development of heat resistant alloys is attached to aluminum and tin ... The alloy was annealed ... creep resistance

L 1500-65
ACCESSION NR: AT4048075

of Ti-Al-Zr along Ti_3Al-Zr was tested at 750C and 15 kg/mm^2 for 1000 hours. The creep ... that small additions of zirconium ... This alloy was further improved ... solid solution of Ti_3Al ... On the basis of testing it was found that ... and molybdenum also improved the ... solid solution ... has 6 figures.

...: none

SUBMITTED: 15Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 007 OTHER: 000

Card 2/2

EWT ... EPR/ EWP(t) EWP ... ASD(f)-3

AT4048077 ... /0227/0235

Kornilov, I. I. (Professor, Doctor of chemical sciences); ~~M. I. Voshedchenko~~, ... M. ...

...tive study of heat resist...
... 550 and ...
... metallurgii, metal... titana ...
... on Metallurg...

... metallurgii ... ... eneniyu ... splavov. 5th, Moscow, 1963. Metall... titana ... of titanium); trudy* soveshchaniya. Moscow, Izd-vo ..., 227-235

TOPIC TAGS: titanium, alloy, heat resistant alloy, aluminum containing alloy, manganese containing alloy, tin containing alloy, molybdenum containing alloy, vanadium containing alloy, chromium containing alloy, iron containing alloy, silicon containing alloy, boron containing ...

ABSTRACT: Solid and welded 1 mm-thick sheets of OT4, VT5-1, VT14, ... OT4-2, AT3, AT4, AT6, and AT8 titanium-base alloys (see Table ... Enclosure) were tested for heat resistance at 450, 550, 650

L 16468-65
ACCESSION NR: AT4048077

0

and 700C by the centrifugal method. In a 2000-hr test at 450C, stresses was maintained at 2.5 kg/mm^2 for the first 1000 hr, in- ... kg/mm^2 for the next 500 hr, and ... increased to ... the last 500 hr. ... conducted under a ... stress at 550, 650, and 700C for 1000, 750, and 150 hr, respectively. It was found that the heat resistance of AT3, AT4, AT6, and AT8 alloys at all temperatures is higher than that of T3M, ..., VT14, and VT5-1 alloys. Heat resistance of AT3, AT4, AT6, ... welds at 450 and 550C was equal ... of the parent ... and 750C it was higher. ... alloy is heat ... up to 450—500C, AT4 alloy ... and AT6 alloys at up to 550—600C. AT3 and AT4 alloys retained their ...al properties after being tested at 450—600C, while T3M ... its ductility and VT14 alloy softened at these temperatures, ... therefore, cannot be ... heat resistant. ... has: ... figures and 3 tables.

...: none

Card 2/4

L 16463-65
ACCESSION NR: AT4048077

SUBMITTED: 15Jul64 ENCL: 01 SUB CODE: MM

NO REF SOV: 010 OTHER: 000 ATD PRESS: 3147

Card 3/4

[illegible]

ACCESSION NR: AT4048077

ENCL: 01

Table 1. Chemical composition of titanium-alloy sheets

Alloy	Al	Cr	Fe	Si	B	Sn	Mn	Mo	V	C	N	H
[illegible] free Al	—	0,8	0,5	0,5	0,01	—	—	—	—		—	—
[illegible]	2,8	0,80	0,32	0,45	0,01	—	—	—	—	0,053	[illegible]	[illegible]
[illegible]	[illegible]	0,39	0,31	0,57	0,01	—				[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]						[illegible]
[illegible]	[illegible]	—	0,175	0,07	—	—	1,34	—	—	[illegible]	[illegible]	0,007
[illegible]	[illegible]	—	—	—	—	—	1,1	—			—	—
T3M	—	—	—	—	—	—	—	2,5	—	—	—	—
VT14	3,0	—	0,001	0,009	—	—	—	2,0	1,1	0,03	0,01	0,007

Card 4/4

L 24851-65 EWO(j)/EWT(m)/EPF(c)/EPR/T/EWP(t)/EWP(b) Pr-4/Ps-4 ASD(m)/ESD(t)/

ACCESSION NR: AP4046096 S/0126/64/018/003/0457/0459

AUTHOR: Kornilov, I. I.; Glazova, V. V.

TITLE: Comments on the question of the physical and chemical nature of solid solutions of O_2 in α-Ti

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 3, 1964, 457-459

TOPIC TAGS: solid solution, alpha titanium, specific resistance, Hall coefficient, hole type conductivity, scale resistance

ABSTRACT: Ti-O_2 alloys were found to have a resistance to scale formation with an O_2 content of approximately 5 atm. %. Specific resistance, thermoelectromo- ... and the Hall coefficient were investigated in α solid solutions of Ti with ... The hole-type conductivity of α-Ti is attributed to the electrons that ... zone to a considerable degree. Apparently ... Ti, the O_2 ... this zone immediately. The hole type ... has been ... subject but the authors propose that ... of the ... effect of various alloying elements in the formation of binary and

Card 1/2

L 24851-65
ACCESSION NR: AP4046096

other more complex Ti alloys be based on it. In alloying Ti with O_2 the thermo- ... motive force and the Hall coefficient decrease and change their sign from ... to negative with an O_2 concentration of 4.2 ... atm. %. It follows ... dissolving O_2 in alpha-Ti contributes a certain part of electrons to the general group of electrons forming a metallic bond with the solvent. Specific resistance appreciably increases upon the addition of up to 1.5 atm. % O_2 although ... of further additions remains negligible. The authors acknowledge the ... of L. S. Milevskiy. Orig. art. has 3 figures.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 24Dec63 ENCL: 00

SUB CODE: MM, SS NO REF SOV: 008 OTHER: 002

Card 2/2

L 25274-65 EWP(e)/EWT(m)/EPF(n)-2/EPR/T/EWP(t)/EWP(b) Ps-4/Pu-4 JD/JG/AT/WH
ACCESSION NR: AP5001520 S/0020/64/159/005/1123/1126
28
26
B

AUTHOR: Kornilov, I. I.;

TITLE: The asymmetry of intersolubility in metallic systems

SOURCE: AN SSSR. Doklady, v. 159, no. 5, 1964, 1123-1126

TOPIC TAGS: electron structure asymmetry, transition element, binary metallic system, metal intersolubility, metallide, electropositive metal, electronegative metal, d shell

ABSTRACT: This intersolubility was studied and is tabulated for binary systems of transition elements of groups IV-VIII (called "A") and the aluminum or tin ("B"). The former are almost insoluble in the latter (up to 0.1%) at the solidus point, while the B-metals are highly soluble in A. The tables are incomplete and values have been extrapolated or interpolated to obtain the missing values for the series studied. The following regularities were observed: 1-upon interaction of metals of the transition groups with more electronegative metals the solubility of the

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L 25274-65
ACCESSION NR: AP5001520

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former in the latter is insignificant while that of the electronegative metals is high; 2-maximal solubility is seen for the metals of group IV with the maximal number of unfilled electrons in the d-shell; 3-within the same group solubility will diminish with increasing electropositivity of the metal (from Ti → Zr → Hf → Th), i.e. with increasing difference in electronegativity of the interacting metals; 4- this solubility will also decrease with increase of the atomic number and the gradual filling with electrons in the d-shell of the atom; it corresponds to the order: Ti → V → Cr → Mn → Fe → Co → Ni. In general, it may be concluded that the limit of solubility of the electronegative element in the electropositive will be very high, and inversely in the same system the electropositive metal will be very poorly soluble in the electronegative. While the reasons for such behavior have not been studied in detail, the author assumes them to be related to the asymmetry of electron structure of the interacting atoms in the system. The electropositive metals have large "free" outer electrons in the lattice; if other elements are dissolved in these, a larger number of electrons from the electronegative elements will be attracted, without formation of chemical bonds, while the electronegative metals have a greater tendency to attract electrons and

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L 25274-65
ACCESSION NR: AP5001520

2

form oriented bonds between the electrons of the heterogeneous atoms, resulting in metallide formation. The following aluminides with high Al content were found in these binary systems: $TiAl_{12}$, VAl_{11}, $CrAl_7$, $MnAl_6$, $FeAl_3$, etc. Orig. art. has: 2 figures and 1 table

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 16Jun64 ENCL: 00 SUB CODE: SS, MM

NR REF SOV: 005 OTHER: 000

Card 3/3

L 44569-65 EWP(e)/EWT(m)/EWP(w)/EPF(n)-2/EWG(m)/EWA(d)/EPR/T/EWP(t)/EWP(b)/EWA(c)
Ps-4/Pu-4 JD/JG/AT/WH

AM5012739 BOOK EXPLOITATION UR/ 39 B+1

Kornilov, Ivan Ivanovich

Metallides and their interaction (Metallidy i vzaimodeystviye mezhdu nimi), Moscow, Izd-vo "Nauka", 1964, 179 p. illus., biblio. (At head of title: Akademiya nauk SSSR. Gosudarstvennyy komitet po chernoy i tsvetnoy metallurgii pri Gosplane SSSR. Institut metallurgii im. A. A. Bkykova) Errata slip inserted. 1,500 copies printed.

TOPIC TAGS: metallide, metalloid alloy, metallochemistry, solid state physics, metal property, metal, metal compound

PURPOSE AND COVERAGE: Metallides are formed as the result of interaction between metals or metals and metalloids. Because of their physical properties, metallides have been widely used in developing new high-strength, fire-proof, and chemically stable materials. Some metalloid compounds with super-conductivity, semi-conductor, magnetic, optic, and other properties have been widely used in new engineering fields such as power engineering, aviation engineering, radiotechnology, electronics, etc. The author presents earlier expressed ideas on the interaction of metallides, formations of solid solutions, compounds and mechanical mixtures among di-, tri- and even more complex metallic compounds and the present state of the theory on the interaction of metallides. Basic factors which determine the conditions for the formation of solid solutions and heterogenic alloys based on metallides, and

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L 44569-65

AM5012739 3

presents areas in which metallides can be used as a new class of inorganic materials are demonstrated.

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Foreword - - 3
Ch. I. Metallochemistry and metallides - - 7
Ch. II. Metallides among inorganic compounds - - 16
... among metallides - - 5?
... graphy - - 174

L 27504-66 EWT(m)/EWP(j) JD/WW/GS/RM/JH

ACC NR: AT6012362 SOURCE CODE: UR/0000/65/000/000/0003/0010

AUTHORS: Kornilov, I. I. (Doctor of chemical sciences, Professor); Glazova, V. V.

55
54
B+1

ORG: none

TITLE: The physicochemical nature of alloys of the system Ti--Al--O

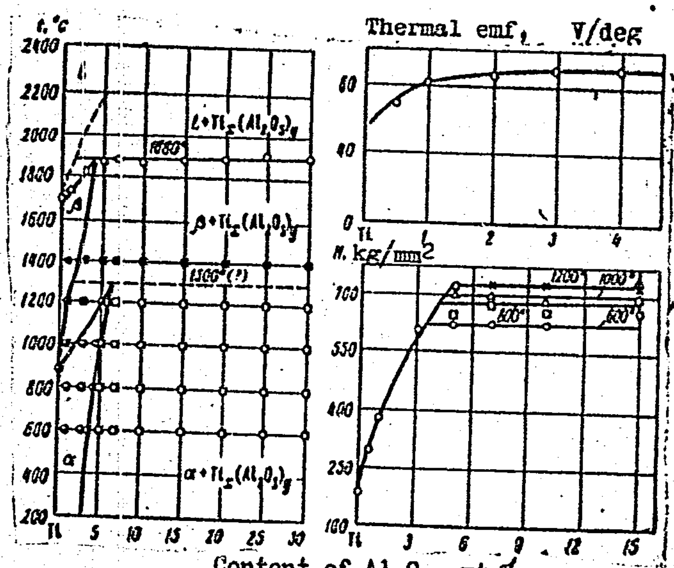
27 27 27

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 3-10

TOPIC TAGS: titanium, aluminum, oxygen, alloy phase diagram, metal physical property

ABSTRACT: The phase relationships and some physical properties of the phases, e.g., microhardness, thermal emf, microstructure, electrical resistance and Hall constants, were determined for the quasi-binary system Ti - Al_2O_3 belonging to the ternary system Ti--Al--O. The investigation supplements earlier results of I. I. Kornilov and V. V. Glazova (Issledovaniye diagrammy sostoyaniya i nekotorykh svoystv splavov sistemy titan-kislorod - Sb Metallovedeniye titana Izd-vo Nauka, 1964). The experimental results are presented graphically (see Fig. 1). Alloying titanium with 5 at. % oxygen considerably increases the stability of titanium toward oxidation, which is associated with a change in the electrical conduction mechanism from hole to electronic conduction. The introduction of aluminum into the alloy considerably increases the thermal

Fig. 1. Phase diagram of the system Ti - Al_2O_3 (a); microhardness of alloys annealing at different temperatures (b); and thermal emf (c) as a function of Al_2O_3 content.



emf of the latter. The influence of oxygen and aluminum on the physicochemical properties of the alloys was found to be different, but both elements enhance the strength of the chemical bond. It is concluded that aluminum oxide Al_2O_3 forms molecular complexes in α-titanium. Orig. art. has: 5 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 016/ OTH REF: 004

Card 2/2 BLG

L 39782-66 EWT(m)/EPF(n)-2/T/EWP(t)/ETI IJP(c) JH/JW/JD/WS/GD-2/JG

ACC NR: AT6012366 SOURCE CODE: UR/0000/65/000/000/0030/0036

AUTHORS: Kornilov, I. I. (Doctor of chemical sciences, Professor); Nartova, T. T.

ORG: none

TITLE: Phase equilibrium and properties of alloys of the quasi-ternary system $Ti_3Al - Ti_3Sn - Zr$

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya, Moscow, Izd-vo Nauka, 1965, 30-36

TOPIC TAGS: titanium, aluminum, tin, zirconium, alloy phase diagram, ternary alloy

ABSTRACT: The phase diagram of the quasi-ternary system $Ti_3Al - Ti_3Sn - Zr$ was determined. The system was prepared after the method of A. A. Fogel' (Izv. AN SSSR, OTN, Metallurgiya i toplivo, 1959, No. 2, 24). The microstructure of the various alloys formed by the system was studied, and the specific electrical resistance of the alloy was determined. Photographs of polished sections of the alloys are presented. On the basis of the experimental results a phase diagram for the system was constructed (see Fig. 1).

Card 1/2

L 39782-66

ACC NR: AT6012366

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720010-7

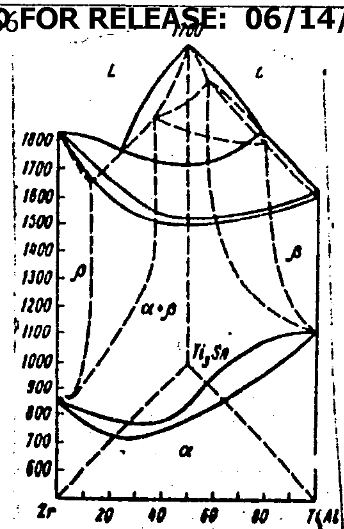


Fig. 1. Phase diagram of the system $Ti_3Al - Ti_3Sn - Zr$.

Orig. art. has: 5 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 007/ OTH REF: 002

Card 2/2

L 27502-66 EWT(m)/T/EWP(t)/ETI IJP(c) JH/JD/GS

ACC NR: AT6012369 SOURCE CODE: UR/0000/65/000/000/0048/0055

AUTHORS: Kornilov, I. I. (Doctor of chemical sciences, Professor); Volkova, M. A.; Pylayeva, Ye. N.; Kripyakevich, P. I.; Markiv, V. Ya.

ORG: none

48
B+1

TITLE: Investigation of equilibrium diagrams of titanium-rich alloys of the system Ti--Al

27 18 27

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 48-55

TOPIC TAGS: titanium, aluminum, alloy phase diagram, titanium alloy, binary alloy, lattice parameter

ABSTRACT: The phase diagram of the binary system Ti-Al (containing up to 30% Al) was determined. The diagram was constructed on the basis of thermal, microstructural, dilatometrical, and x-ray analysis. In addition, the specific electrical resistance and hardness of the alloy specimens were determined. The investigation supplements earlier work of N. V. Grum-Grzhimaylo, I. I. Kornilov, Ye. N. Pylayeva, and M. A. Volkova, (Dokl. AN SSSR, 1961, 137, No. 3, 599). The experimental results are summarized in graphs and tables (see Fig. 1) and compared to earlier literature data. A rearrangement takes place in the alloys in the temperature region from 882 to 1250C. These temperatures correspond to a transition from a hexagonal close-packed structure

2

L 27502-66

ACC NR: AT6012369

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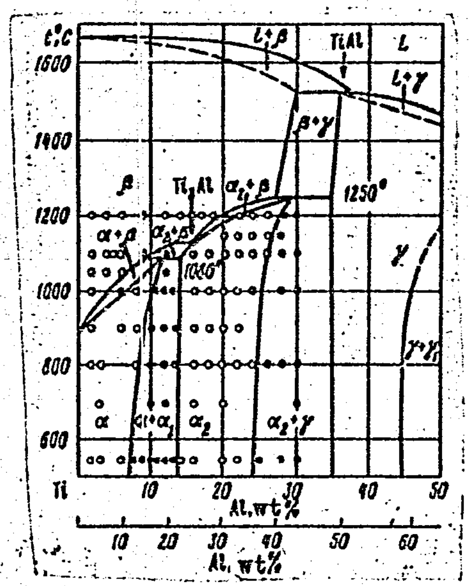

Fig. 1. Phase diagram of the system Ti--Al.

to a body-centered structure. The curves for the properties of alloys vs composition exhibit a minimum, the composition of which corresponds to the intermetallic compound Ti_3Al. The existence of the compound Ti_3Al was corroborated by x-ray analysis. The structure of Ti_3Al was found to resemble the Mg_3Cd structure. The lattice parameter

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L 27502-66

ACC NR: AT6012369

of the system Ti-Al was determined as a function of the composition (see Fig. 2).

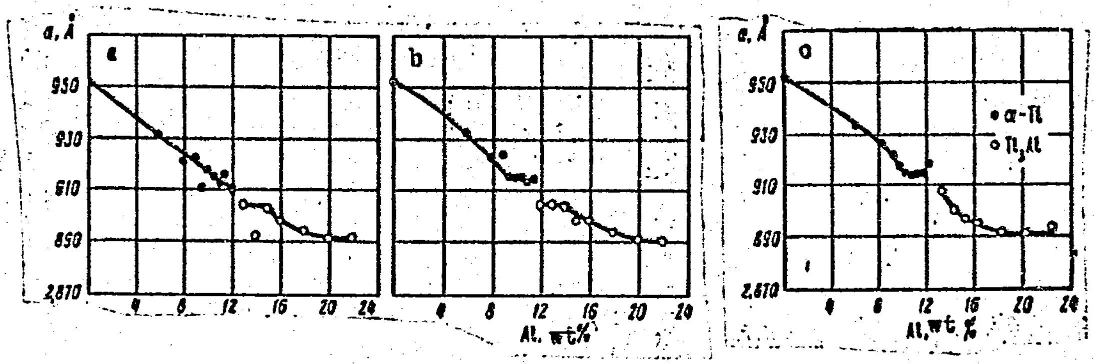

Fig. 2. Dependence of the lattice parameter of the alloy composition of the system Ti--Al annealed at 950C (a), 700C (b), and 550C (c).

Orig. art. has: 1 table and 6 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 006/ OTH REF: 004

Card 3/3 BLG

L 27501-66 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/ETI JD/JW/GS/JH

ACC NR: AT6012370 SOURCE CODE: UR/0000/65/000/000/0056/0060

AUTHORS: Kornilov, I. I. (Doctor of chemical sciences, Professor); Matveyeva, N. M.

ORG: none

66 B+1

TITLE: Thermochemical investigation of alloys of the system Ti--Al in the α-solid solution region

27 27

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 56-60

TOPIC TAGS: titanium, aluminum, titanium alloy, heat of solution, heat of formation, hardness, solid solution

18

ABSTRACT: The integral heat of solution, the standard heat of formation, and the hardness of alloys formed in the system Ti--Al in the α-solid solution region were determined. The enthalpies were determined by measuring the appropriate heats of solution in 1% hydrofluoric acid. A schematic of the calorimeter is presented, as are the experimental results in graphs and tables (see Fig. 1). It was found that the minimum in integral heat of solution vs composition curve corresponded to the minimum hardness in the hardness vs composition curve and to the composition of the compound Ti_3Al. The experimental results are in good agreement with those of O. Kubaschewski and W. Dench (Acta metallurg., 1955, 3, No. 4). The standard heat of formation at 25C

2

Card 1/2

L 27501-66

ACC NR: AT6012370

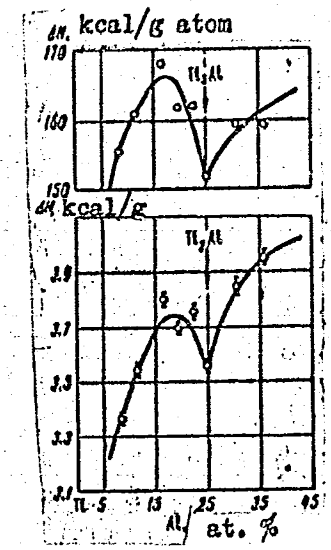

Fig. 1. Dependence of the heat of solution ΔH on the alloy composition of the system Ti--Al.

of the alloy containing 25 at. % Al was found to be 6.400 ± 0.125 kcal/g atom. Orig. art. has: 1 table and 3 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 004/ OTH REF: 009

Card 2/2

L 27500-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD/JG/GS

ACC NR: AT6012371 SOURCE CODE: UR/0000/65/000/000/0061/0074

AUTHORS: Boriskina, N. G. (Candidate of technical sciences); Kornilov, I. I. (Doctor of chemical sciences, Professor)

ORG: none

38
B+1

TITLE: Structure of alloys of the systems Ti--Fe and Ti--Cr--Fe

18 27 27 27

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 61-74

TOPIC TAGS: titanium, chromium, iron, alloy phase diagram, hardness

ABSTRACT: The microstructure and hardness of the alloys as a function of composition and the phase diagrams of the systems Ti--Fe and Ti--Cr--Fe were studied. The experimental results supplement an earlier investigation of N. G. Boriskina and I. I. Kornilov, (Izv. AN SSSR, OTN, Metallurgiya i toplivo, 1960, No. 1, 50). The experimental results are presented in graphs and tables (see Figs. 1 and 2). The microstructural results are in good agreement with the hardness measurements. The decrease in the γ - phase is due to a peritectic reaction or decomposition with the formation of the compound TiFe.

2

ACC NR: AT6012371

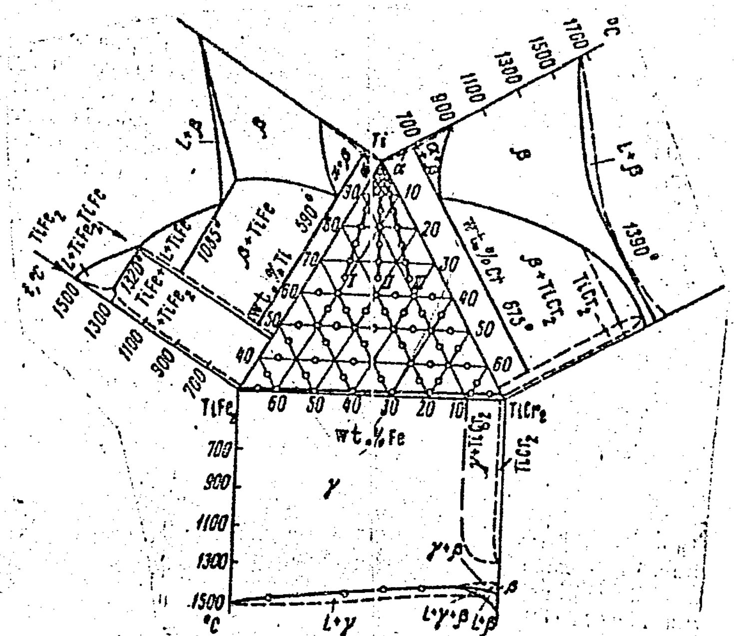

Fig. 1. Phase diagram of the system $Ti--TiCr_2--TiFe_2$ (points indicate the composition of alloys studied).

Card 2/3

L 27500-66

ACC NR: AT6012371

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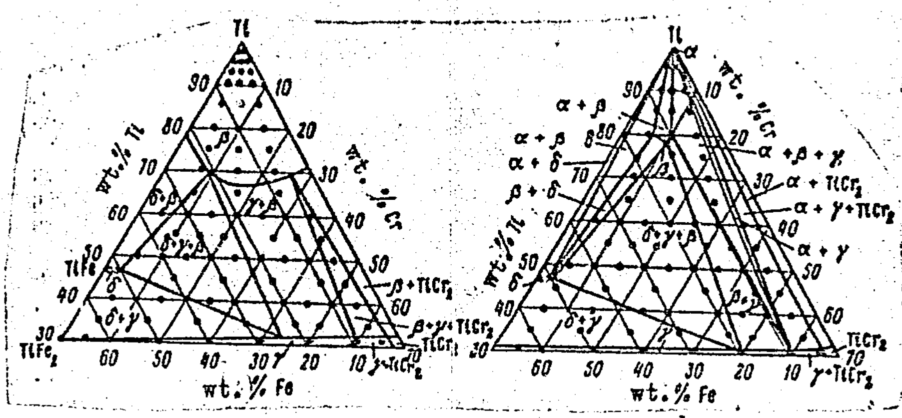


a

b

Fig. 2. Isothermal sections of the system Ti--$TiCr_2$--$TiFe_2$ at 1000° (a) and 550° (b).

Orig. art. has: 1 table and 9 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 012/ OTH REF: 007

Card 3/3 BLG

L 30786-66 EWT(m)/T/EWP(t)/ETI IJP(c) JH/JD/...

ACC NR: AT6012375 SOURCE CODE: UR/0000/65/000/000/0092/0097

AUTHORS: Kornilov, I. I. (Doctor of chemical sciences, Professor); Volkova, M. A.; Pylayeva, Ye. N.

20

B+1

ORG: none

TITLE: Investigation of the alloys of the ternary system Ti--Al--V

27 27 27

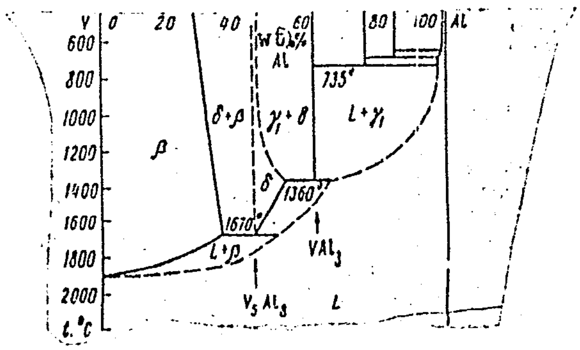
SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniva. Moscow, Izd-vo Nauka, 1965, 92-97

TOPIC TAGS: titanium, aluminum, vanadium, alloy phase diagram , ternary alloy, hardness

ABSTRACT: The alloys of the system Ti-Al-V were studied. The experimental results supplement an earlier investigation by I. I. Kornilov, Ye. N. Pylayeva, M. A. Volkova, P. I. Kripyakevich, and V. Ya. Markiv (Nastoyashchiy sbornik, str. 48). The experiments were carried out with titanium iodide (99.7% Ti), AV000 aluminum (99.99%) and carbothermal vanadium (99.5% V). The phase diagrams of the system and the micro-structure, hardness, and electrical resistance of the alloys were determined. Experimental results are presented graphically (see Fig. 1). The minimum hardness and electrical resistance of alloys containing 15--16% Al and an Al/V ratio of 3:1 are due to the formation of a solid solution on the basis of the compound Ti_3Al in the ternary system.

Card 1/3

ACC NR: AT6012375



Orig. art. has: 6 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 002/ OTH REF: 005

Card 3/3

L 30354-66 EWT(m)/EWP(t)/ETI IJP(c) JD/WB/GD

ACC NR: AT6012377 SOURCE CODE: UR/0000/65/000/000/0102/0109

AUTHORS: Kornilov, I. I. (Doctor of chemical sciences, Professor); Vinogradov, Yu. M.

ORG: none

72
64
B+1

TITLE: Titanium and its alloys for large-scale chemistry

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 102-109

TOPIC TAGS: CHEMICAL PLANT EQUIPMENT, PIPE, titanium, titanium alloy, corrosion resistance, corrosion resistant alloy, heat exchanger, corrosion resistant metal / VT1 titanium, OT4-1 titanium alloy, AT2 titanium alloy, AT3 titanium alloy, AT4 titanium alloy, AT6 titanium alloy

ABSTRACT: Examples are given of the use of titanium and its alloys in recent years on the basis of research and design work of various organizations. The Scientific Research Institute of Chemical Machine Construction (Nauchno-issledovatel'skiy institut khimicheskogo mashinostroyeniya) built one of the first containers of OT4-1 titanium alloy and also welded pipe of VT1 titanium for operation in a medium

Card 1/2

L 30354-66

ACC NR: AT6012377

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000824720010-7

containing H_2SO_4, $(NH_4)_2SO_4$, acid resin, hydrogen, benzene hydrocarbons, ammonia, hydrogen sulfide, etc, at temperatures of 60—70C. Heat-exchange and filtering apparatus have also been made with VT1 titanium. Titanium inserts for lining steel chemical apparatus have been created. AT2 titanium alloy is designed for cryogenic devices to liquid-helium temperatures; AT3 titanium alloy is designed for operation in a sulfuric acid medium at 300--350C under pressure. Alloy AT4 is used for compressor machines, and alloy AT6 is used for autoclaves. The new corrosion-resistant alloys required now and in the future are outlined. Orig. art. has: 8 figures and 1 table.

SUB CODE: 07,11/ SUBM DATE: 02Dec65/ ORIG REF: 021

Card 2/2

KORNILOV, I.I. (Moskva); MINTS, R.S. (Moskva); GUSEVA, L.N. (Moskva); MALKOV, Yu.S. (Moskva)

Interaction of the NiAl compound with niobium. Izv. AN SSSR. Met. no.6:132-136 N-D '65. (MIRA 19:1)

1. Submitted July 30, 1964.

L 44145-65 EPF(c)/EPR/EWG(j)/EWT(m)/EWP(b)/EWP(t)

3194

Tavestiva, Metally,

titanium, aluminum oxide, titanium ... alloy, ... diagram, alloy structure, aluminum oxide solubility, alloy ...

ABSTRACT: A series of $Ti-Al_2O_3$ alloys containing from 0 to 30 wt% ... melted from 99.9%-pure iodide titanium, ... wt% Al, and a Ti- master ... furnace with a ... The microscopic analysis ... system to be ... ature of the alloys increased from 1675C for pure Ti to 1880C at an Al_2O_3 content of 4 wt%, and remained constant with a further increase in the Al_2O_3 content. When quenched from 600 and 800C, alloys con- ... to 3 wt% Al_2O_3 had a single-phase structure and could ...

Card 1/4

L 44145-65

ACCESSION NR: AP5009275

forged at 1200C without cracking. In alloys containing 5 wt% Al_2O_3, a second phase of a $Ti_x(Al_2O_3)_y$ composition is present in an amount which increases with increasing Al_2O_3 content. After quenching from ... the structure of alloys containing 1, 3, and 5 wt% Al_2O_3 ... amount of the ... hardness of alloys ... determined from microhardness, amounted to 3, 4, ... 900, 1000, and 1200C, respectively. The phase ... binary Ti-Al ... system ... at which ... wt% ... In the solid ... an appreciable solubility ... selection of the alloy ... temperature ... Orig. art. has: 5 figures.

[MS]

Card 2/4

L 22991-66 EWT(m)/EWP(w)/EWA(d)/T/EWP(t) IJP(c) JD/HW/GS

ACC NR: AT6012394 SOURCE CODE: UR/0000/65/000/000/0221/0228

AUTHOR: Kornilov, I. I. (Doctor of chemical sciences, Professor); Ivanova, V. S.; Markovich, K. P.; Fridman, Z. G.

60
58
B+1

ORG: none

18 18 27

TITLE: Heat resistance of AT3 titanium alloy after standard heat treatment and after mechanothermal heat treatment

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 221-228

TOPIC TAGS: titanium, titanium alloy, aluminum containing alloy, chromium containing alloy, heat resistant alloy, alloy heat treatment, mechanothermal treatment, alloy creep resistance, alloy rupture strength / AT3 alloy

ABSTRACT: The heat resistance of AT3 titanium alloy (2.7% Al, 0.6% Cr, 0.3% Fe, 0.36% Si, 0.01% B) has been tested at 350 and 500C. After standard heat treatment (annealing at 880C followed by air cooling) the structure of the alloy consisted of the α-phase and traces of the β-phase. The creep rate at 350C changed relatively little with a

Card 1/2 UDC: 669.295.001.5

L 22991-66

ACC NR: AT6012394

2

change in stress. The 10,000 hr rupture strength 18 was 56 kg/mm^2, i.e., about 90% of the tensile strength. Prolonged service at 350C affects neither the structure nor the properties of the alloy. For instance, the elongation dropped from the initial 15% to 13% after 5454 and 5215 hr tests under a respective stress of 15 and 37 kg/mm^2. The high rupture strength, structural stability, high oxidation resistance, and high ductility make AT3 alloy a promising structural material for prolonged operation at 350—450C. At 500C, however, the alloy softens rapidly. The 500 hr rupture strength was only 22 kg/mm^2. Microscopic examination showed that the softening of AT3 alloy at 500C was due to precipitation of Ti_5Si_3 compound (the γ-phase) from the solid solution along the active slip planes. Four cycles of mechanothermal treatment 17 (24 hr at 500C under a stress of 12 kg/mm^2 followed by 24 hr without stress at the same temperature) prolonged the second creep stage at 500C by nearly five times and more than doubled the rupture life. In alloy subjected to MTT and subsequent creep tests, the precipitated γ-phase particles were more uniformly distributed over the grain volume. Orig. art. has: 6 figures and 2 tables. [MS]

SUB CODE: 11, 13/ SUBM DATE: 02Dec65/ ORIG REF: 006/ OTH REF: 002
ATD PRESS: 4238

Card 2/2 *dla*

L 40094-66 EWT(d)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) EM/JD/JG/GD

ACC NR: AT6012395 SOURCE CODE: UR/0000/65/000/000/0229/0237

AUTHORS: Kornilov, I. I. (Doctor of chemical sciences; Professor); Boriskina, N. G. (Candidate of technical sciences)

51
47
B+1

ORG: none

27 27 27

TITLE: Some mechanical and physical properties of alloys of the system Ti--Cr--Fe

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 229-237

TOPIC TAGS: elastic modulus, titanium containing alloy, chromium containing alloy, iron containing alloy, metal physical property, mechanical property

ABSTRACT: A continuation of earlier studies by N. G. Boriskina and I. I. Kornilov (Sb. Titan i yego splavy, vyp. X. Izd-vo AN SSSR, 1963, p. 300) is presented, in which the properties of the alloy system Ti--Cr--Fe are investigated. Alloys were prepared with 3:1, 1:1, and 1:3 iron-to-chromium content ratio with combined iron and chromium content ranging from 1 to 12.5%. Base materials were titanium TG00 (99.8% Ti and 0.06% O_2), electrolytic iron (99.9% Fe and 0.028% C), and chromium (99.9% Cr and 0.02% O_2). Tests were performed to measure the strength limit and relative elongation properties, the characteristics of specimen microstructure, thermal

Card 1/2

L 40094-66

ACC NR: AT6012395

stability, strain versus time relationships, and electrical conductivity of the alloys. The mechanical properties of titanium-rich alloys are, after alloy tempering at 1000C, 750C, and curing at 400C, a function of the content and phase structure of the alloys. Both the alloy content and alloying process are specified for favorable strength and strain properties. Iron-chromium-titanium alloys can also be made for high thermal strength, but the thermal resistance varies significantly with the alloying process. The resistivity is increased through the content of iron and chromium in a titanium-based alloy. The phase structure is also found to control the modulus of normal elasticity of the alloys. Orig. art. has: 8 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 007/ OTH REF: 001

Card 2/2

L 36529-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/GD

ACC NR: AT6012396 SOURCE CODE: UR/0000/65/000/000/0238/0242

AUTHORS: Kornilov, I. I. (Doctor of chemical sciences, Professor); Livanov, V. A.; Belousov, O. K.; Faynbron, S. M.; Mikheyev, V. S.; Ivanova, S. Ye.; Ryabova, R. M.

ORG: none

TITLE: The effect of thermal processing on the mechanical properties of type AT2 alloys

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 238-242

TOPIC TAGS: titanium, titanium alloy, tempering, thermal treatment / AT2 titanium alloy

ABSTRACT: The results are given for studies of the effect of thermal processing on the mechanical properties of type AT2 alloys. Several compositions were investigated, which displayed high plastic and shock-resistance properties at room and at low (-196 and -253C) temperatures. These alloys were given the designations AT2-1, AT2-2, and AT2-3, and were produced in sheets in industrial conditions. Measurements were made of the dependence of the resistivity of these compositions on the testing temperature (see Fig. 1). Thermal processing was bounded in the temperature range 500--1000C. The thermal process included: 1) heating at the prescribed temperature for 30 minutes; 2) 60-minute air-cooling, and 3) 60-minute oven cooling. The mechanical properties of the

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UDC: 669.295.001.5

L 36529-66

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R00082472001

ACC NR: AT6012396

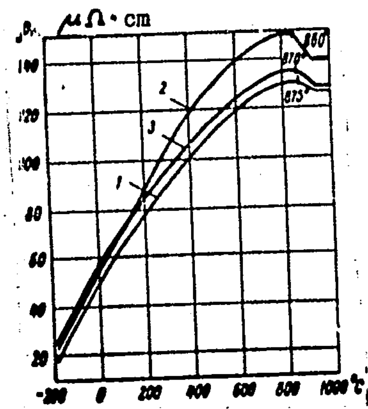

Fig. 1. The dependence of the resistivity on the testing temperature of alloys AT2. 1 - AT2-1; 2 - AT2-2; 3 - AT2-3.

alloys are related to the observed changes in the alloy microstructure occurring with varied thermal processing. Recommendations are: 30- to 60-minute thermal treatment at 500 to 600C with subsequent air cooling for alloy AT2-1; 600C processing for alloy AT2-2; and 500--600C processing for AT2-3. The optimal mechanical properties obtained with the recommended processing are summarized. Orig. art. has: 5 figures.

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 008

Card 2/2 MLP

L 22342-66 EWT(m)/EWP(w)/EWA(d)/T/EWP(t) IJP(c) MJW/JD/GS

ACC NR: AT6012397 SOURCE CODE: UR/0000/65/000/000/0243/0246

AUTHOR: Kornilov, I. I. (Doctor of chemical sciences; Professor); Shakhova, K. I.; Nuss, P. A.; Klimov, B. A.; Budberg, P. B.; Chernova, T. S.; Zuykova, N. A.

54
46
B+1

ORG: none

TITLE: Some mechanical and physical properties of AT13 alloy

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 243-246

TOPIC TAGS: titanium, titanium alloy, aluminum containing alloy, zirconium containing alloy, molybdenum containing alloy, alloy mechanical property, alloy physical property /AT13 alloy

ABSTRACT: On the basis of experimental data on titanium alloys gathered at the Laboratory of the Chemistry of Metallic Alloys of the Institute of Metallurgy im. A. A. Baykov, a new, eight-component, high-strength weldable titanium alloy AT13 has been developed. The alloy liquidus and solidus temperatures were found to be 1800 and 1675C, respectively. The alloy structure consists mainly of the α-phase with a very insignificant amount of the β-phase. The α→β transformation occurs in the 1030-1050C range; no other transformation occurs in the 100—1000C range. At room temperature, AT13 alloy has a tensile strength of 127—129 kg/mm^2, a yield

Card 1/2 UDC: 669.295.001.5

strength of 120—125 kg/mm^2, an elongation of 4—6%, a reduction of area of 30—35%, an impact toughness of 3 $kg \cdot m/cm^2$, and an HV hardness of 258 kg/mm^2. In the annealed condition the alloy has an elasticity modulus of 13,600 kg/mm^2, a shear modulus of 4850 kg/mm^2, and a Poisson ratio of 0.4. The alloy softens insignificantly at 500—600C, but the tensile and yield strengths drop sharply as the test temperature increases to 700C. The creep rate at 500 and 600C is low, but sharply increases at 800C. The alloy elongation and the coefficient of thermal expansion increase uniformly with increasing temperature. The alloy resistivity was 1.73 and 1.84 $ohm \cdot mm^2/m$ in the annealed and in the strained condition, respectively. AT13 has the highest electric resistance of all the alloys used for heating elements, i.e., Kh20N80T3 (Nichrome) or 0Kh27Yu5A (alloy no. 2) and special electric heater alloys MNMts3-12 (manganin) or MNMts40-1.5 (constantan). Further research on AT13 alloy is planned. Orig. art. has: 4 figures. [MS]

SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 007/ ATD PRESS: 4241

L 36530-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JH/WW/JD/JG

ACC NR: AT6012398 SOURCE CODE: UR/0000/65/000/000/0247/0250

AUTHORS: Kornilov, I. I. (Doctor of chemical sciences, Professor); Nartova, T. T.; Andreyev, O. N.

ORG: none

TITLE: A study of the strength of titanium alloys by the method of bending at 600C

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 247-250

TOPIC TAGS: titanium, titanium alloy, heat resistance, heat resistant alloy, aluminum containing alloy / TG-110 titanium, AV000 aluminum

ABSTRACT: A study was performed on the mechanical properties and heat strength of titanium alloys of several compositions containing 6--6.5% aluminum. Basic materials used in preparing the alloys were titanium TG-110 and aluminum AV000. Other elements were introduced in the form of alloys or as pure metals. The chemical contents of the alloying elements used in 12 different alloys are as given in Fig. 1. Additional information is given in regard to the specimen preparation procedure. Measurements were made of the variation of the deflection indicator with time for the 12 alloys tested under controlled conditions of temperature and pressure. The tests indicated that the heat strength of alloys containing 6--6.5% aluminum increases because of the

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L 36530-66

ACC NR: AT6012398

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Fig. 1. Chemical composition of investigated titanium alloys (in wt %)

Alloy number	Al	Zr	Sn	Mo	Nb	Ce
1	6,0	—	—	—	—	—
2	6,0	—	5,0	—	—	—
3	6,0	3,0	—	—	—	—
4	6,0	3,0	5,0	—	—	—
5	6,0	3,0	5,0	—	1,5	—
6	6,0	3,0	5,0	1,5	—	—
7	6,5	—	—	—	—	—
8	6,5	—	6,5	—	—	—
9	6,5	3,0	6,5	—	—	—
10	6,5	3,0	6,5	—	—	—
11	6,5	3,0	6,5	—	—	0,01
12	6,5	3,0	6,5	2,0	—	—
				2,0	—	0,01

content of α-hard mixture in multicomponent alloying. The highest heat strength at 600C was exhibited by the alloy system containing Ti-Al-Zr-Sn. Alloys with a two-phase (α + β)-structure exhibit at 600C a high creep and are not heat resistant at the given temperature. A series of compositions of the alloys studied showed a high tensile strength at room and high temperatures in correspondence with adequate plastic properties. The results verify the possibility of applying the centrifugal method for studying the comparative heat strengths of alloys. Orig. art. has: 2 figures and 2 tables.

Card 2/2 mlp SUB CODE: 11/ SUBM DATE: 02Dec65/ ORIG REF: 009

KORNILOV, I.I.

Classification of metallic compounds according to the nature of chemical bonds. Izv.AN SSSR.Neorg.mat. 1 no.10:1635-1641 0 '65. (MIRA 18:12)

1. Institut metallurgii imeni A.A.Baykova, Moskva. Submitted July 5, 1965.

GLAZOVA, V.V.; KORNILOV, I.I.

Temperature dependence of the electric conductivity of titamium and zirconium suboxides. Izv. AN SSSR. Neorg. mat. 1 no.10: 1834-1837 O '65. (MIRA 18:12)

1. Institut metallurgii imeni A.A. Baykova, Moskva. Submitted March 25, 1965.

KORNILOV, I.I. (Szovjetunio)

Metallochemistry and preparation of new inorganic substances. Technika 9 no.2:2 F '65.

L 7930-66 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) IJP(c) JD/WW/JG

ACC NR: AP5027934 SOURCE CODE: UR/0363/65/001/010/1778/1786

AUTHOR: Kornilov, I. I.; Glazova, V. V.

ORG: Institute of metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: The character of chemical bonding in titanium and zirconium suboxide

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 10, 1965, 1778-1786

TOPIC TAGS: titanium oxide, zirconium compound, chemical bonding, semiconducting material, hafnium oxide

ABSTRACT: Phase equilibria of the titanium-oxygen and zirconium-oxygen systems were studied on alloys containing 32 and 28 at. % oxygen, respectively. After annealing, the samples were subjected to microscopic and qualitative x-ray structural analyses, and measurements of microhardness, electrical resistance, and thermoemf were made. The suboxides Ti_6O and Ti_3O, having a metallic bond type, were found to form in this system. Ti_6O is formed from the α solid solution and is stable up to 820-830C. Ti_3O is formed during crystallization from the melt at 1940C. Both compounds have a singular point on the property-composition (microhardness-composition; electrical resistance-composition; thermoemf-composition) diagrams. In the Zr-O system, two distinct singular maxima were observed on the composition-electrical resistance diagram, corresponding to the compounds Zr_6O and Zr_3O; this indicates the semiconductor nature of these compounds. The temperature dependence of the electrical resistance of all four compounds confirmed the assumption that Ti_6O and

UDC: 546.831'21+546.821'21

Card 1/2

2

L 7930-66

ACC NR: AP5027934

2

Ti_3O have a metallic bond type, and that Zr_6O and Zr_3O have a semiconductor bond type. It is suggested that the compounds Hf_6O and Hf_3O may exist in the hafnium-oxygen system, where a broad region of α solid solutions based on the low-temperature modification of hafnium is known to exist. The study of the interaction of zirconium and oxygen was carried out by Ye. M. Kenina. Orig. art. has: 8 figures.

SUB CODE: SS, IC, GC / SUBM DATE: 05Jul65 / ORIG REF: 010 / OTH REF: 014

55

OC

Card 2/2

L 7925-66 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) IJP(c) JD/WW/JG

ACC NR: AP5027939 SOURCE CODE: UR/0363/65/001/010/1834/1837

AUTHOR: Glazova, V. V.; Kornilov, I. I.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: Temperature dependence of the electrical conductivity of titanium and zirconium suboxide

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 10, 1965, 1834-1837

TOPIC TAGS: zirconium compound, titanium oxide, electric conductivity, forbidden zone width, chemical bonding

ABSTRACT: In order to establish the physicochemical nature of the compounds Ti_6O, Ti_3O, Zr_6O, and Zr_3O, the temperature dependence of their electrical resistance was studied by a contactless method in a rotating magnetic field. The curves obtained for Ti_6O and Ti_3O (see Fig. 1) are typical of compounds with a metallic bond type.

 UDC: 546.831'21+546.821'2

L 7925-66

ACC NR: AP5027939

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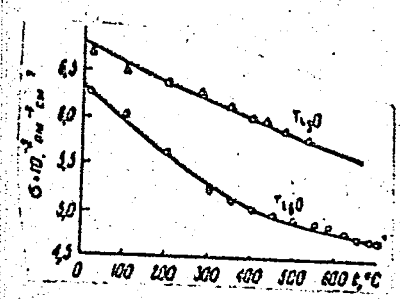
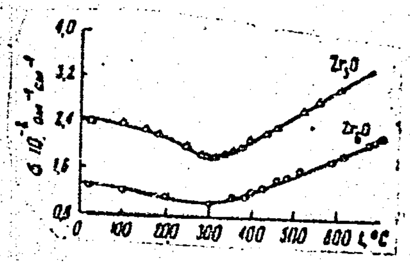
Fig. 1
Temperature dependence of the electrical conductivity of the compounds Ti_6O and Ti_3O.



The curves for Zr_6O and Zr_3O (see Fig. 2) show that these two oxides are semiconductors.

Fig. 2
Temperature dependence of the electrical conductivity of the compounds Zr_6O and Zr_3O.



Card 2/3

L 7925-66

ACC NR: AP5027939

It was found that the electrical conductivity of Zr_6O and Zr_3O at high temperatures is described by the equation

$$\sigma = \underline{A} \exp(-\Delta \underline{E}/2\underline{k}T),$$

where $\Delta \underline{E}$ is the forbidden gap width; $\underline{A}$, the preexponential coefficient; $\underline{k}$, Boltzmann's constant; σ, the electrical conductivity; and T, the absolute temperature. $\Delta \underline{E}$ was calculated to be 0.18 and 0.20 for Zr_6O and Zr_3O, respectively. These values are not definitive because deviations from stoichiometry are possible in the samples, but they are of fundamental significance in that they demonstrate the presence of a forbidden gap, and hence, the semiconductor nature of Zr_6O and Zr_3O. Differences in the bonding types of zirconium and titanium oxides are discussed. Orig. art. has: 3 figures.

SUB CODE: IC, GC / SUBM DATE: 25Mar65 / ORIG REF: 010 / OTH REF: 002

Card 3/3

L 31111-66 EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD/WW/JG

ACC NR: AP6001237 SOURCE CODE: UR/0363/65/001/012/2205/2207

AUTHOR: Kornilov, I. I.; Alisova, S. P.; Rydberg, P. B.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: Diagram of the phase equilibrium of the intermetallic system $NbCr_2$ - $ZrCr_2$

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 12, 1965, 2205-2207

TOPIC TAGS: niobium compound, chromium compound, zirconium compound, solid solution, intermetallic compound, phase equilibrium, phase diagram, thermal analysis

ABSTRACT: The study involved a section of the ternary system Bn-Zr-Cr between the intermetallic compounds $NbCr_2$ and $ZrCr_2$, which are AB_2-type Laves phases having a polymorphous transition. High-temperature thermal analysis with N. A. Nedumov's apparatus, and x-ray phase and microstructural analyses were employed. The phase diagram obtained was characteristic of a system with a continuous series of solid solutions. A comparison of $NbCr_2$ and $ZrCr_2$ showed the same lattice type and only slight differences in lattice constants; in addition, the atomic similarity of the elements and the closeness of the stoichiometric composition led to the conclusion that a continuous series of solid solutions is formed between both the low-temperature and high-temperature modifications of these compounds. Orig. art. has: 4 figures and 1 table.

SUB CODE: 11, 07 / SUBM DATE: 28May65 / ORIG REF: 006 / OTH REF: 001

Card 1/1 UDC: 546.74'76+546.831'76

~~L 63336-65 EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD~~

ACCESSION NR: AP5017478

UR/0370/65/000/003/0170/0175 18
669.017.14
B

AUTHOR: Kornilov, I. I.; Nartova, T. T.

TITLE: Study of the equilibrium diagram of the quasiternary system Ti_3Al-Ti_3Sn-Zr

SOURCE: AN SSSR. Izvestiya. Metally, no. 3, 170-175

TOPIC TAGS: quaternary system, quasiternary system, phase equilibrium, quasibinary system, solid solution, multicomponent titanium system, eutectic diagram, polythermal constitution diagram, phase region

ABSTRACT: The quaternary system Ti-Zr-Al-Sn consists of components with different metallochemical properties. Titanium and zirconium in this system are the closest analogues and together form continuous solid solutions (with α- and β-modifications). Aluminum and tin, being more electronegative than titanium and zirconium, on interacting with the latter two metals form limited solid solutions and the series of metallides: Ti_4Al, Ti_3Al, TiAl, $TiAl_3$, Ti_3Sn, Ti_2Sn,

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ACCESSION NR: AP5017478

Ti_5Sn_3, Ti_6Sn_5, Zr_3Al, Zr_2Al, Zr_5Al_3, Zr_3Al_2, Zr_4Al_3, ZrAl, Zr_2Al_3, Zr_2Al_2, $ZrAl_3$. In this connection, the authors investigated alloys of the quasiternary system Ti_3Al-Ti_3Sn-Zr -- a triangular variety of the quaternary system Ti-Zr-Al-Sn -- with the object of exploring the nature of the interaction between its components, with their chemically different nature, the phase equilibrium, and the pattern of the variation in properties as a function of the composition and structure of multicomponent titanium systems. The phase equilibrium of alloys of this system was microstructurally investigated at 1200, 1000, and 800°C. The features of the metallochemical properties of the selected components were reflected in the nature of the chemical interaction between alloys of the quaternary system Ti-Zr-Al-Sn. At high temperatures the phase equilibrium is characterized by a quasiternary constitution diagram consisting of three quasi-binary systems of which two, Ti_3Al-Ti_3Sn and Ti_3Sn-Zr, are diagrams of the eutectic type and the third, Ti_3Al-Zr, is a diagram with a continuous series of solid solutions. At low temperatures (of the order of 600°C) a continuous series of α- solid solutions with a hexagonal lattice based on compounds of Ti_3Al and Ti_3Sn and α-zirconium should exist throughout the investigated range

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ACCESSION NR: AP5017478

of concentrations in the quasiternary system Ti_3Al-Ti_3Sn-Zr. On the basis of results of the investigation of isothermal sections the authors constructed a polythermal constitution diagram of the quasiternary system Ti_3Al-Ti_3Sn-Zr showing in three-dimensional form the phase regions of the system, from crystallization temperatures to room temperature. Orig. art. has: 5 figures.

ASSOCIATION: none

SUBMITTED: 16Jul64 ENCL: 00 SUB CODE: SS, MM

NO REF SOV: 007 OTHER: 002

dm

Card 3/3

L 64485-65 EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD/JG

ACCESSION NR: AP5021504

UR/0370/65/000/004/0168/0175
669.017.13

AUTHOR: Kornilov, I. I. (Moscow); Shakhova, K. I. (Moscow); Budberg, P. B. (Moscow)

TITLE: Phase diagram of the Ti-Nb-Cr system

SOURCE: AN SSSR. Izvestiya. Metally, no. 4, 1965, 168-175

TOPIC TAGS: alloy phase diagram, titanium alloy, niobium alloy, chromium alloy

ABSTRACT: The phase diagram for the Ti-Nb-Cr system is studied in the region bounded by the Ti-Nb side and by the cross section which passes through the metallic compounds (metallides) $TiCr_2$-$NbCr_2$. The alloys for the study were melted in an arc furnace with a nonconsumable tungsten electrode in an argon atmosphere. Every alloy was remelted six or seven times. The charge was made up of titanium iodide and TG-113 titanium, 99.27% pure pig niobium and 99.98% pure electrolytic chromium. All specimens went through homogenizing annealing in a TVV-2M furnace in an argon atmosphere at temperatures of 1300-1500°C. Specimens with a high titanium content were annealed for 60-70 hours while those rich in chromium and niobium went through a 200-240 hour annealing. Microstructural and x-ray analysis showed that these an-

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ACCESSION NR: AP5021504

nealing temperatures produced an equilibrium state in the alloys. The samples were then subjected to the following vacuum heat treatment: quenching from 1000°C after holding for 100-150 hours; quenching from 800°C--holding for 350-450 hours; quenching from 600°C--holding for 500-550 hours. The compositions studied are situated along four radial sections of the concentration triangle starting from the chromium point with titanium:niobium ratios of 4:1, 3:2, 2:3, and 1:4. The phase structure of the alloys was determined by microstructural analysis, Debye x-ray phase analysis, hardness and electrical resistance measurements, and by using the optical method to determine the temperature at which the alloys begin to melt. Polythermal and isothermal sections of the system were studied for every 100° in the 1300-1900°C range, (see figs. 1-7 of the Enclosure). Orig. art. has: 4 figures.

ASSOCIATION: none

SUBMITTED: 10Mar64 ENCL: 07 SUB CODE: MM

NO REF SOV: 005 OTHER: 000

Card 2/9

L 43101-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JH/JD/HW/JG

ACC NR: AP6014119 (A) SOURCE CODE: UR/0370/65/000/006/0132/0136

AUTHORS: Kornilov, I. I. (Moscow); Mints, R. S. (Moscow); Guseva, L. N. (Moscow); Malkov, Yu. S. (Moscow)

ORG: none

52
B

TITLE: Interaction of NiAl with niobium

SOURCE: AN SSSR. Izvestiya. Metally, no. 6, 1965, 132-136

TOPIC TAGS: nickel containing alloy, aluminum containing alloy, niobium containing alloy, alloy phase diagram

ABSTRACT: The phase diagram of the system NiAl-Nb was investigated. The microhardness and microstructure of the various phases and the superconductivity of the compounds NbNiAl and Nb_2NiAl were determined. The experimental results are summarized in graphs and tables (see Fig. 1). It was found that the Nb—Ni—Al system forms two intermetallic compounds, viz: NbNiAl and Nb_2NiAl. The compound Nb_2NiAl becomes superconductive at 4.2K, but the compound NbNiAl does not become superconductive at the temperatures investigated, i.e., down to 1.4K. The superconductivity experiments were performed at the laboratory of the Institute for Physics Problems, AN SSSR (Laboratory of N. Ye. Alekseyevskiy, corresponding member).

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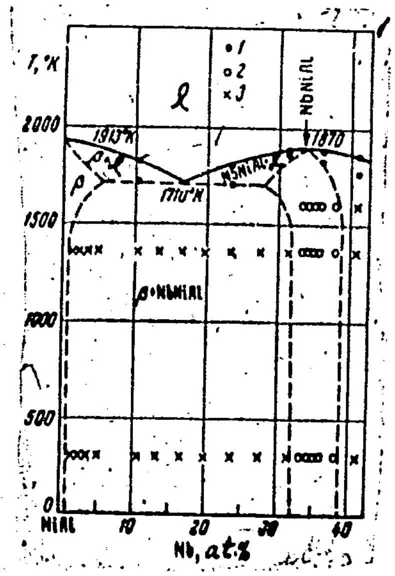
UDC: 669.715

L 43101-66

ACC NR: AP6014119

Fig. 1. Phase diagram of the system NiAl--Nb (up to 40 at.% Nb): 1 - points obtained by thermal analysis; 2 - one-phase structure; 3 - two-phase structure.



Orig. art. has: 4 tables and 3 figures.

SUB CODE: 11/ SUBM DATE: 30Jul64

Card 2/2 MLP

L 00999-66 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) IJP(c) JD/JG

ACCESSION NR: AP5018248 UR/0078/65/010/007/1660/1662
546.821-31

30
B

AUTHOR: Kornilov, I. I.; Glazova, V. V.

TITLE: On thermal stability of the Ti_3O compound in the titanium-oxygen system

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 7, 1965, 1660-1662

TOPIC TAGS: titanium, titanium oxide, titanium compound, titanium alloy, titanium oxide physical property

ABSTRACT: A series of alloys of the Ti-O system containing 22—28 at% oxygen were investigated to determine whether the Ti_3O compound remains stable at temperatures above 1400C. All the alloys homogenized at 800C were found to be single-phase alloys with a polyhedral structure. Slip lines were observed in all the alloys, with the maximum number of slip lines in the alloy with 25 at% oxygen, a composition corresponding to that of Ti_3O compound. Microhardness-composition and resistivity-composition curves for alloys annealed at 1000, 1400, and 1600C for 4 hr and quenched have an identical pattern with a minimum for both characteristics at 25 at% oxygen. Thermal analysis showed that alloy with 25 at% oxygen undergoes no changes either on heating up to the melting point (1940C) or on cooling. All this proves that Ti_3O

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compound is stable at temperatures up to the melting point. The Ti_3O crystallizes directly from the liquid phase. The x-ray diffraction patterns revealed a lattice structure similar to the structure of α-titanium. The stability of the compound is one of the factors which explains why oxygen cannot be completely removed from titanium alloys by outgassing in vacuum. On the basis of obtained data the ordinate corresponding to the existence of Ti_3O compound was added to the phase diagram of the Ti-O system (see Fig. 1 of the Enclosure). Orig. art. has: 5 figures. [WW]

ASSOCIATION: none

SUBMITTED: 25Feb64 ENCL: 01 SUB CODE: MM,TD

NO REF SOV: 006 OTHER: 003 ATD PRESS: 4069

Card 2/3

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ACCESSION NR: AP5018248

ENCLOSURE: 01

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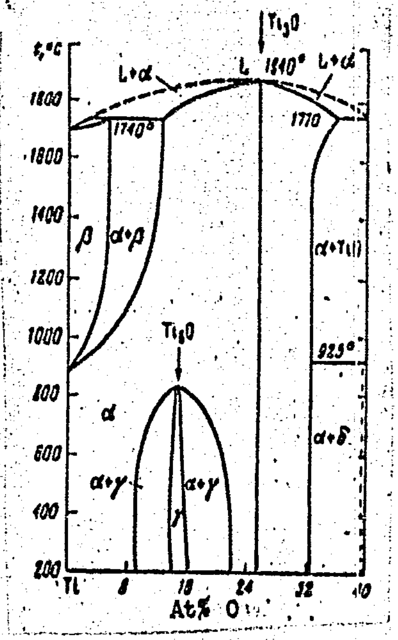

Fig. 1. Titanium-oxygen phase diagram

Card 3/3 DP

KORNILOV, I.I.

Development of studies in the chemistry of metals. Usp. khim. 34 no.1:103-131 Ja '65. (MIRA 18:4)

1. Institut metallurgii imeni Baykova AN SSSR, Moskva.

L 44790-65 EWT(m)/EPR/EWP(t)/EWP(b) Ps-4 IJP(c) JD

ACCESSION NR: AP5010833 UR/0020/65/161/004/0843/0846

AUTHOR: Kornilov, I. I.; Pylayeva, Ye. N.; Volkova, M. A.; Kripyakevich, P. I.; Markiv, V. Ya.

28 27 B

TITLE: Phase composition of binary Ti-Al alloys containing from 0 to 30% Al

SOURCE: AN SSSR. Doklady, v. 161, no. 4, 1965, 843-846

TOPIC TAGS: titanium aluminum system, titanium alloy, aluminum containing alloy, [illegible] phase composition, alloy resistivity, alloy hardness

[illegible] Binary Ti-Al alloys containing from 0 to 30% Al, levitation melted or arc [illegible] an inert gas atmosphere, were investigated in [illegible] condition or de- [illegible] --1000C with a reduction of 30%. The thermal analysis data showed [illegible] undergo the solid state transformation [illegible]. [illegible] Microscopic examination and x-ray diffraction patterns revealed the following phases (solid solutions): β—on a β-Ti base, α—on an α-Ti base, α_2—on a base of the ordered tetragonal structure of Ti_3Al compound of the Mg_3Cd type. Results of the measurements of the resistivity and hardness closely corresponded to one another and confirmed the results of the thermal, metallographic, and x-ray analysis. A phase diagram of the investigated Ti-Al system based on the results obtained is shown in Fig. 1 of the Enclosure. Orig. art. has: 3 figures. [MS]

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L 44790-65

ACCESSION NR: AP5010833

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 22Sep64 ENCL: 01 SUB CODE: IC

NO REF SOV: 003 OTHER: 004 ATD PRESS: 3256

Card 2/3

L 44790-65

ACCESSION NR: AP5010833

ENCLOSURE: 01

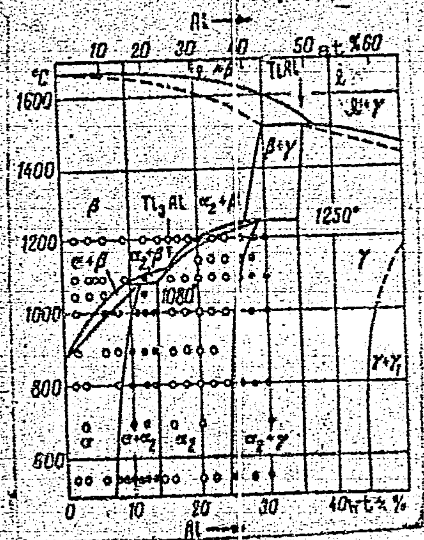

Fig. 1. Phase diagram of the binary Ti-Al system

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